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Physically, mechanically and stylistically Professor Skinner's College Algebra is a tidy piece of work. It is up-to-date in its inclusions, exclusions and emphases. Its early use of geometric representation is happy. The notion of function occupies a dominant place in the entire perspective. In the definition of this notion (p. 49) the meaning of the term "known" may lead to interesting dialectic, especially if the function be implicit. Five convenient tables are inserted at the end of the volume.

Professor Dowling's "Projective Geometry" is a handsome introduction to the most exquisitely beautiful of mathematical subjects. The treatment, which is in the manner of Reye's classic "Geometrie der Lage," is synthetic as distinguished from algebraic, and presupposes no knowledge beyond ordinary elementary geometry and a very little trigonometry. It does not aim at the rigor of the postulational method, but is preliminary thereto and admirably qualifies the reader to appreciate the nature and the value of that method.

In his "Elliptic Integrals" Professor Hancock has compressed a large amount of matter into a small compass. If the work be too compact for most of those who would like to read it, the fault is not that of the author but rather that of the editors who desired him to write a work which "shall relate almost entirely to the three well-known elliptic integrals, with tables and examples showing practical applications, and which shall fill about one hundred octavo pages." This assigned task has been done faithfully, and the reader will thank the author for his full citation of the literature of the general subject.

C. J. KEYSER

COLUMBIA UNIVERSITY

SPECIAL ARTICLES

INHERITANCE OF WINTER EGG PRODUCTION

PRELIMINARY REPORT

A. Progeny of a Cornish Male.—A Cornish male was mated simultaneously to several (5) Rhode Island Red hens of high fecundity

families with a mean winter production of 52.5 eggs and to several Cornish females. The latter are poor winter layers with a mean of 8.47 eggs. There were 33 pullets from the Cornish and Rhode Island Red cross with a mean winter production of 49.2 eggs, the range being 21-86.

The offspring of this male with pure Cornish females were 11 in number and with the exception of a single individual were poor winter layers, the average of all being 11.6 eggs.

The result from the Cornish male and Rhode Island Red female cross is diametrically opposed to that obtained by Pearl from Cornish males (of the same strain that I used) bred to Barred Plymouth Rock females which are good winter layers. The offspring of this cross gave a mean winter production of 16.7 eggs. The reciprocal cross, viz., Barred Rock males and Cornish females, gave an average winter production of 30.7. We have no data at present from the corresponding cross with Rhode Island Reds. It is clear from the results of my experiment that high-producing hens are able to transmit this ability directly to her daughters, that is, high fecundity in Rhode Island Reds is not sex-linked.

B. A Theory of the Inheritance of Winter Egg Production Alternative to Pearl's.—It has been found that the observed ratios in which high and mediocre producers occur, both in Pearl's data on Barred Plymouth Rocks and my own with a large series of Rhode Island Reds, can be explained satisfactorily by assuming that high egg production depends upon two factors that follow the usual dihybrid Mendelian scheme. One factor alone, in either simplex or duplex condition, is assumed to give mediocre production. This theory encounters only one difficulty, viz., in a few instances there is a deficiency in the expected numbers of high producers, a result easily explicable with a physiological character such as egg production. Pearl's theory, however, encounters the reverse difficulty, *i. e.*, high producers appear where none are expected. This difficulty is explained by Pearl on the very reasonable assumption that it is due to an overlapping of phaenotypes.

There is, however, a serious difficulty with the data from both sources. This difficulty lies in the fact that the average number of daughters per mother is extremely small. The average number of daughters per mother in Pearl's experiment was 2.85, while in mine it varies from 2.6 in the early years to 6.75 in later years. Because of the small size of the families it is possible to fit any family into a place in either scheme, since the ratios expected for the various matings differ only slightly from one another. In spite of the doubt raised as to the *mode* of inheritance of winter egg production it is clear that this character is inherited, for high and low fecundity lines are readily established by suitable matings along family lines.

H. D. GOODALE

MASSACHUSETTS AGRICULTURAL
EXPERIMENT STATION

THE AMERICAN ASSOCIATION FOR
THE ADVANCEMENT OF
SCIENCE
SECTION D—ENGINEERING

THE first session was held on the morning of Friday, December 28, in Thaw Hall, University of Pittsburgh, Vice-president Dr. Henry S. Drinker in the chair, with an attendance of about thirty. It was announced that the Sectional Committee had recommended for election to the General Committee, for the office of vice-president, Dr. Ira N. Hollis, of Worcester, and for the office of secretary, Dr. Frederic L. Bishop, University of Pittsburgh. The following officers were elected by the Section:

Member of Council—Dr. George F. Swain, of Harvard University and the Massachusetts Institute of Technology.

Member of General Committee—Charles Henry Davis, of Cambridge, Mass.

Member of Sectional Committee—William Bowie, of Washington, D. C.

The program of the session was as follows:

Railroad track, its defects and abuses, and their amelioration: G. H. BARBOUR. *Historical*: The age of the drawn and that of the driven wheel; ancient English tramways; the institution of that distinctively American principle now governing the construction of railroad

track as now practised by all the steamroads in the world, wherein the equipment upon its track constitutes a flexible superstructure upon an elastic roadbed. *Defects*: Weak rails; narrow railheads; excessive deflections; joints. *Abuses*: Worn and ragged wheels; improper wheel spacing; dynamic augments; lateral thrusts. *Amelioration*: Increased bearing on ballast; decreased depth of ballast; augmentation of rail; increased lateral strength; broader head; more frequent lateral fastenings; maintaining height of rail at the minimum.

The scientific principles of building codes: J. A. FERGUSON. A good building code occupies a very responsible position among the vital issues of municipal welfare. Properly planned, a building code should insure safety to life, limb, health and property, and should function to minimize loss or injury to either. Progress in the arts has introduced many new factors in the occupation of buildings, which necessitate the scientific handling and classification of the requirements and progress in building has made it possible to classify the various forms of building construction into distinct groups. The same progress has made it possible to classify occupancies and construction of buildings and to specify the minimum allowable construction for the various occupancies. This it is now proposed to do in one notable case for the city of Pittsburgh, Pa. Other phases of this subject are susceptible of scientific definition, and in order to properly regulate buildings it is becoming increasingly necessary to classify and define in a scientific manner all subjects. The paper gives typical arrangement for a code and explains the reasoning upon which it is based as well as for the classification of other regulatory provisions in a good building code.

Relative efficiency of different methods of repairing bituminous macadam and bituminous concrete pavements: GEORGE H. BILES. The bituminous macadam and bituminous concrete pavements in their various stages of disrepair offer excellent opportunity to the highway engineer for study and experiment. The methods of repairs to pavements of these types have advanced to such a degree in recent years that there are innumerable instances where pavements have been reclaimed by scientific analysis of the causes of deterioration and by efficient application of the principles of repair applicable to each case. Central bituminous mixing plants are advisable where the amount of yardage and its accessibility warrant as in cases of municipalities. In most other cases,